

Software Interface Assessment of the Centralized Aviation Flight Records System (CAFRS) 4.0

by Gina A Pomranky-Hartnett, David B Durbin, and Jamison S Hicks

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14. ABSTRACT The US Army Research Laboratory's Human Research and Engineering Directorate (ARL/HRED) conducted a software interface assessment of the Centralized Aviation Flight Records System (CAFRS) version 4.0. The assessment was performed to identify CAFRS software design features (e.g., menu screen navigation) that enhanced or degraded user performance. CAFRS is used to manage Army aviation flight and air traffic services records that contain information such as the number of flight hours that pilots have flown and status of pilot and unit flight training requirements. CAFRS provides the Army's senior-level leadership with aviation flight operations information to assist in resource, readiness, and personnel management. Participants were able to effectively use CAFRS to maintain aviation flight records and quickly complete most tasks during the assessment. Software interface and functionality problems were reported by the participants and addressed by the software developers. ARL/HRED will assess future CAFRS versions to enhance the software interface.					
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Contents

List of Figures	iv
List of Tables	iv
1. Introduction	1
1.1 Background	1
1.2 System Description.....	2
2. Method	9
2.1 Test Participants	9
2.2 Data Collection.....	9
2.3 Assessment Limitations.....	9
3. Results	9
3.1 Participant Demographic Data	10
3.2 CAFRS Software User Interface Assessment	11
4. Conclusions	21
4.1 CAFRS v4.0 Software Interface.....	21
4.2 Task Completion Rates and Tasks Times	21
5. References	22
Appendix. CAFRS v4.0 UTE 1 Trouble Reports	23
List of Symbols, Abbreviations, and Acronyms	29
Distribution List	30

List of Figures

Fig. 1	CAFRS architecture.....	3
Fig. 2	CAFRS FORSCOM local database architecture	4
Fig. 3	TRADOC connectivity architecture	5
Fig. 4	CAFRS v4.0 data flow.....	6
Fig. 5	Commander’s task list	7
Fig. 6	DA 7120 progress report	7
Fig. 7	Custom event screen.....	8
Fig. 8	DA 7122 crew member training record.....	8

List of Tables

Table 1	CAFRS software user interface assessment results	12
Table 2	CAFRS software user interface assessment results	14
Table 3	UTE 1 task pass/fail and completion times	19
Table 4	UTE 2 task pass/fail and completion times	20

1. Introduction

1.1 Background

The Centralized Aviation Flight Records System (CAFRS) is used to manage US Army aviation flight and air traffic services (ATS) records that contain information such as the number of flight hours that pilots have flown and status of pilot and unit flight training requirements. The records are managed in accordance with regulations and policies through a centralized, automated, globally accessible, and secure system. CAFRS provides the Army's senior-level leadership with aviation flight operations information to assist in resource, readiness, and personnel management. Commanders have access to essential aviation information to accomplish risk assessment and risk management throughout the aviation mission planning process.

The US Army Research Laboratory's Human Research and Engineering Directorate (ARL/HRED) conducted a software interface assessment of CAFRS version 4.0 (v4.0) during User Test Event (UTE) 1 and UTE 2 at the Aviation Networks and Mission Planning software development facility at Huntsville, AL. UTE 1 was conducted 29 April–2 May 2013 and UTE 2 was conducted 5–8 August 2013. These assessments were performed to identify CAFRS software design features that enhanced or degraded user performance. The following items were evaluated:

- Software menu architecture
- Number of steps required to complete data entry tasks
- Help functions
- Menu navigation
- Error messages
- Logic and intuitiveness of the menu screens
- How quickly v4.0 operated on the host computer
- Comparison of v4.0 with v3.0.3
- Time to complete tasks
- Task pass/fail rates

The assessments supported the CAFRS material release process and led to improvements in the software interface.

ARL/HRED also conducted a software interface assessment of CAFRS v3.0 UTE (in 2009) and v3.0.2 software interface UTE (in 2010). The data collection methodology for each assessment during the UTEs was very similar, to allow comparisons of the software interface for each successive version. The results of the v3.0 and v3.0.2 assessments led to improvements in the software interface. ARL/HRED will assess future versions of CAFRS to improve the software interface and functionality.

1.2 System Description

CAFRS standardizes the process of compiling, tracking, and analyzing flight records and ATS records. This is accomplished by storing information in a centralized repository that can be accessed by the Internet. Internet accessibility provides visibility of unit and individual flight data as well as certification and qualification data above the unit level.

CAFRS augments the Army's ability to more accurately track and control aviator flight and training records, air traffic control (ATC) training records, and unmanned aircraft system (UAS) operators' hours. The CAFRS design requirement is to have a user-friendly software interface while reducing man-hours and recording errors through automation.

CAFRS replaced 3 legacy systems used for maintaining aircrew flight records: the DOS (Microsoft Disk Operating System)–based Automated Flight Records System (AFRS), Aviation Center Flight Records System (ACFRS), and the Unit Level Logistics System-Aviation (ULLS-A) flight operations module for aircrew flight records.

CAFRS is a Microsoft Windows–based client/server application with database functionality for managing and storing flight record information. The CAFRS software can be installed on any Windows-based platform. CAFRS supports battalion- and company-level operations during deployed operations, to include split-base operations and in garrison.

Figure 1 shows the high-level concept of operations of CAFRS v4.0 with both the Army's Forces Command (FORSCOM) and Training and Doctrine Command (TRADOC) architectures.

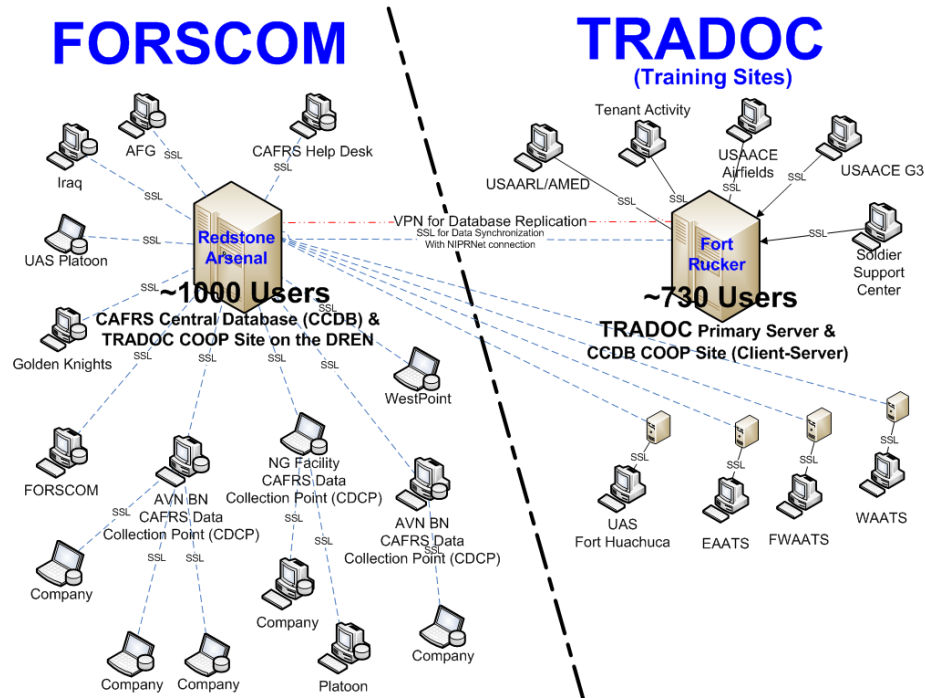


Fig. 1 CAFRS architecture

The CAFRS FORSCOM architecture (Fig. 2) has a local database installed on each CAFRS FORSCOM client machine where all data transactions occur. Network connectivity from a CAFRS FORSCOM client to the central database at Redstone Arsenal, AL, or network connectivity from a company-level CAFRS FORSCOM client to a battalion-level CAFRS FORSCOM machine is not required to perform daily operations. A battalion-level CAFRS machine setup to allow company-level machines to connect for data synchronization is known as a CAFRS Data Collection Point (CDCP).

CAFRS FORSCOM Local DB Architecture

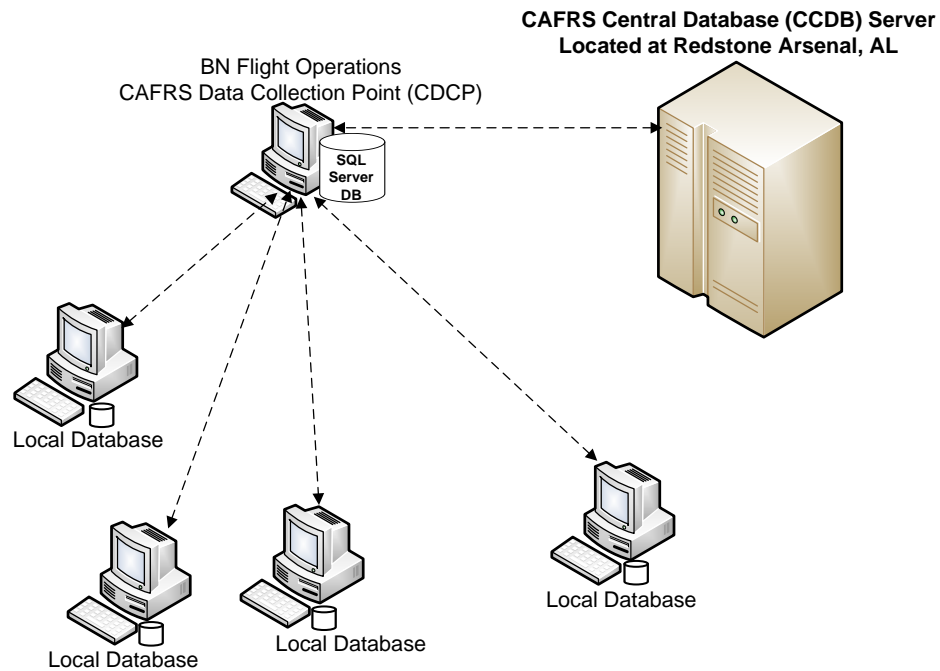


Fig. 2 CAFRS FORSCOM local database architecture

The CAFRS TRADOC architecture shown in Fig. 3 does not have a local database installed on the CAFRS TRADOC client machines. Network connectivity is required for daily operations. All CAFRS TRADOC client machines connect to the TRADOC CAFRS Central Database (CCDB) server where all the data transactions occur.

CAFRS TRADOC Architecture

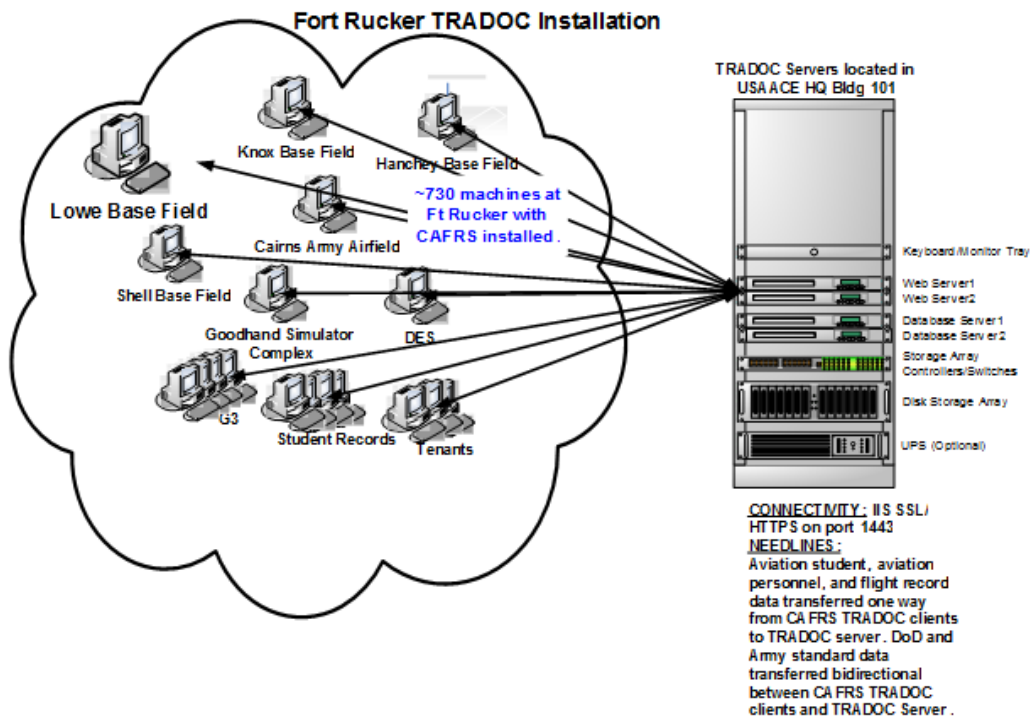


Fig. 3 TRADOC connectivity architecture

The architecture and data flow of CAFRS v4.0 (Fig. 4) consists of the following 3 tiers and nodes:

- CAFRS enterprise servers are the first and highest tier or node in the CAFRS architecture. There are 2 types of enterprise-level servers supporting CAFRS: the CCDB enterprise server or primary CCDB, and the TRADOC CCDB enterprise server or secondary CCDB.
- CDCPs make up the second tier or node of the CAFRS architecture. Numerous CDCPs exist at the Army aviation battalion-level and equivalent organizations, such as Army Aviation Support Facilities within the Army National Guard (ARNG), Operational Support Airlift Command fixed-wing flight detachments, and UAS platoons. The CDCPs' primary functions are to operate as CAFRS clients to support management of aviation flight and training records and to perform data synchronization with the CCDB to keep data current within the CCDB and within each of the CDCPs.
- CAFRS client machines make up the third and lowest tier or node of the CAFRS architecture. A CAFRS client machine is defined as any government computer that has the CAFRS client application installed. Numerous CAFRS client machines operate at all levels to include, but are not limited to, platoon, company, battalion, and other equivalent type organizations, i.e., basically at any level where Army aviation personnel and their flight record data need to be managed.

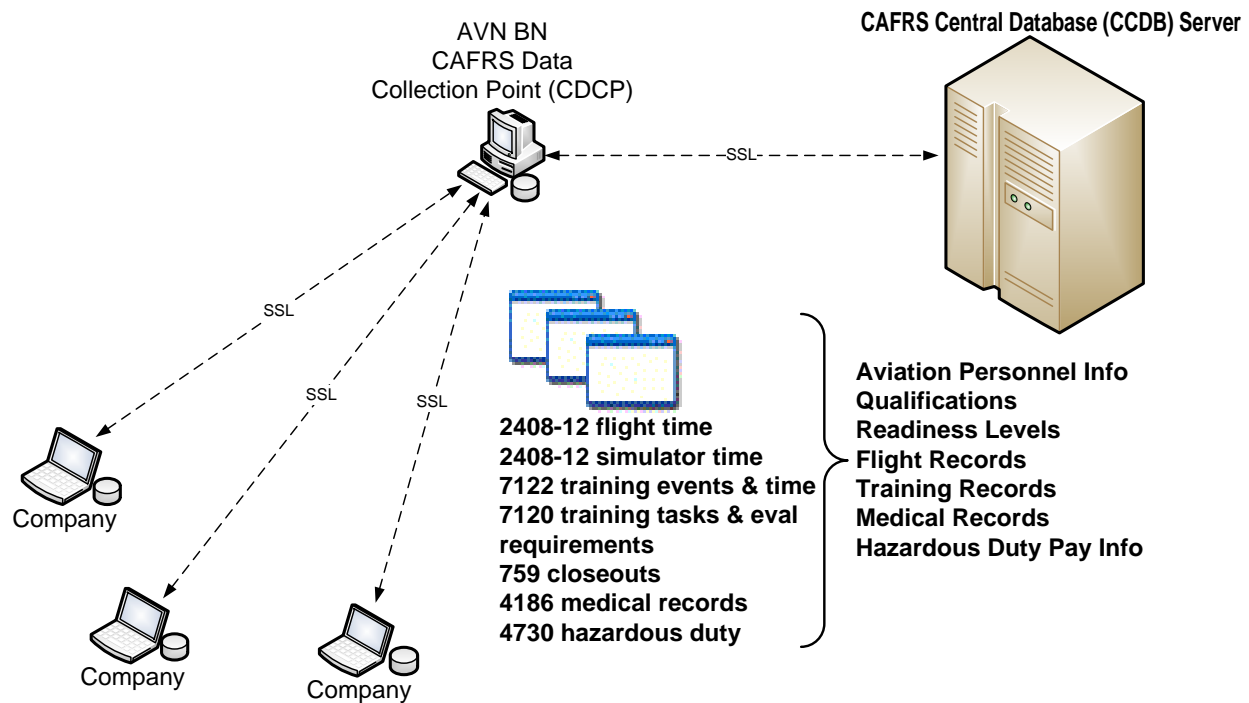


Fig. 4 CAFRS v4.0 data flow

A CAFRS person consists of 2 categories, the user and the aviation person. A CAFRS user is one who has been set up in CAFRS with a login and password for data access. They have no records. An aviation person may be a rated crew member, a nonrated crew member, or a UAS operator, and will have an individual flight record folder associated with them. A user may also belong to ATC, as in the case of a flight operations officer in charge.

A CAFRS user requires permissions to perform virtually any function within CAFRS, such as reviewing the commander's task list (CTL) (Fig. 5), accessing a Department of the Army (DA) 7120 progress report (Fig. 6), adding a custom event (Fig. 7), or accessing and updating a DA 7122 crew member's training record (Fig. 8). The CTL is a list of military tasks meant to be used as a tool to accomplish the commander's intent. The DA 7120 progress report allows a crew member to track the progress of the required task, and the DA 7122 is a comprehensive record of the crew member's training. These permissions will typically be granted by a CAFRS unit administrator based on the role of the user needing the permission. Within CAFRS, some permissions are grouped into common roles based on job description. This allows, for example, a safety officer to have a set of permissions based on his role of safety. These roles can be tailored to meet the needs of each unit.

DA 7120 Commander's Task List

Close Save Save As Apply Template Delete DA 7120 Run Validation

DA7120-R DA7120-1 DA7120-3

COMMANDER'S TASK LIST

For use of this form see TC 3-04.11; the proponent agency is TRADOC

PART I & II & III. PART IV & V.

PART I. BIOGRAPHICAL

Name: Crichton, John A. Rank: MAJ PID: 1272109709 Birth Month: June FAC: 3

Duty Title: Pilot Aircraft Type: UH-60A Primary Additional Alternate

PART II. AUTHORIZED FLIGHT DUTIES/STATIONS

AMC MBO

	CP	PI	PC	UT	IP	IE	SP	MP	ME	XP	MO	Remarks
Right/Back Seat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Authorized to perform PI & CP duties. AMS
Left/Front Seat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See #6 on 7120-3. AMS
Other Station	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
NVG	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

PART III. FLYING-HOUR REQUIREMENTS

Add ATM Hours Prorate Hours

	Annual	First Period	Second Period	Remarks/Adjustments
Dates	01 Jul 12 - 30 Jun 13	01 Jul 12 - 31 Dec 13	01 Jan 13 - 30 Jun 13	
Total Aircraft Hours	0.0	24.0	24.0	
Total Simulator Hours	0.0	24.0	24.0	
Night Unaided Hours	0.0	24.0	24.0	
NVG Hours	48.0	0.0	0.0	
Hood/Weather Hours	48.0	0.0	0.0	
Other Hours (Specify)	0.0	0.0	0.0	
Other Hours (Specify)	0.0	0.0	0.0	

Fig. 5 Commander's task list

DA 7120 Progress Report

Crewmember

7120-R PART II PART III PART IV

Name	Duty Title	MBO	AMC	PART II	PART III	PART IV
Smith, CW3 John	Duty Title	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No Duties Assigned	On Schedule	Completed
West, CW3 Wayne	Duty Title	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CP, PI	On Schedule	Completed
Wilson, CW3 Russell	Duty Title	<input type="checkbox"/>	<input type="checkbox"/>	PI	Behind Schedule	Incomplete
Jackson, CW3 Tom	Duty Title	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CP, PI, UT	Last Month	Incomplete

Ledged - 7120-R

☒ Authorized
 ☒ In APART Completed
 ☒ Last month of APART with Warnings
 ☐ Outside of APART

☐ Not Authorized
 ☒ In APART with Warnings
 ☒ Failed to Meet Requirement or Evaluation

Fig. 6 DA 7120 progress report

Custom Event

Close Save Create New Edit Existing Delete Run Validation

* Event: Training - VOG

* Category: ☒ Rated ☐ NonRated ☐ UAS ☐ All

* Event Text: VOG Training and Familiarization

☐ Event can change RL status

☐ Event can have D/N/NVS/NVG

7122 Remark

759 Remark

Evaluation Requirement

ACT-E
CBAT
CBRN
Instrument Flight Evaluation
Maintenance Test Flight Evaluation
NVG Flight Evaluation
Operator's Manual Written Examination
ROC-V
Standardization Flight Evaluation

* denotes a required field

Data Required for Event

☐ Aircraft
☐ Duty
☐ Hours
☐ Seat
☐ Grade
☐ 7122 Remark
☐ 759 Remark
☐ Commander Signature
☐ Unsat Only

Dropdown shows all Evaluation Requirements used in any DA Form 7120 template in the database

Fig. 7 Custom event screen

DA 7122 Crew Member Training Record - WO1 Lewis K. Jarvis

Close Save As Customize... CDR Sign...

Events RL Progression Timeline DA Form

Add... Edit... Delete Initial with CAC... Filter...

Date	A/C	Event	Duty	D	N	NG	NS	W	H	Sim	Seat	Recorded By	GR	CM Init	Rmk
12 Jun 11	OH-58D	Aircraft Series Qualification	PI								L/R	P. Abercrombie, SPC...			
07 Mar 12	OH-58D	Assignment	PI									F. Dixon, SPC, FLT O...			
20 Apr 12		New Duty Station 4186 (FFD)										F. Dixon, SPC, FLT O...			
22 Apr 12	OH-58D	Commanders Eval - Records Review & PFE-D...	PI	4.8	1.2	2.5			1.4		L/R	J. Reed, CIV, IP		LJ	
07 Jun 12	OH-58D	RL Progression NLT date adjustment-D/N/NV...	PI	14.1	0.8	18.3			1.2		L/R	J. Reed, CIV, IP	S	LJ	
18 Jun 12	OH-58D	Environmental Training	PI	5.5	0.5	8.3					L/R	J. Reed, CIV, IP	S	LJ	
18 Jul 12	OH-58D	Commanders Eval - No Notice Evaluation (Wri...	PI									J. Reed, CIV, IP	U	LJ	
01 Jul 12	OH-58D	CBRN Training	PI	0.7							R	J. Reed, CIV, IP	S	LJ	
02 Aug 12		Annual FDME or FDHS (FFD)										J. Reed, CIV, IP			

Historical Events listed first in date order and display in blue

New column indicates whether a Remark exists on back of form

Regular Events entered out of chronological sequence display in red

Fig. 8 DA 7122 crew member training record

2. Method

Test participants received 2–3 h of training prior to the beginning of each UTE. The training consisted of classroom instruction and hands-on training using a Toughbook personal computer loaded with the CAFRS v4.0 software.

2.1 Test Participants

A total of 14 CAFRS users participated in UTE 1 (6 users) and UTE 2 (8 users). The relevant demographic characteristics of the users are listed in the Results section of this report.

2.2 Data Collection

A software interface questionnaire was used to assess the v4.0 design characteristics that enhanced or degraded user performance. The questionnaire was developed in accordance with published guidelines for proper format and content (O'Brien and Charlton 1996). A pretest was conducted to refine the questionnaire and to ensure that it could be easily understood and completed by test participants.

At the completion of each UTE, the users completed the software interface assessment questionnaire. Questionnaire results were clarified with information obtained during discussions with the users and during the after-action review that was conducted at the end of each UTE.

Test participants also recorded the time required to complete each task and whether they successfully completed the tasks. Problems with the software interface and system functionality were identified and recorded during the UTEs. This helped ensure that the problems would be tracked and resolved for future CAFRS upgrades.

2.3 Assessment Limitations

Primary limitations included the small sample size of users ($N = 14$) who participated in UTE 1 and UTE 2 and limited test time.

These limitations are fairly common due to funding and time constraints. However, the information and data listed in the Results and Conclusions sections of this report should be interpreted based on these limitations. Additional data should be collected during future user and operational tests to augment and expand the findings contained in this report.

3. Results

The following is a summary of the data collected during UTE 1 and UTE 2.

3.1 Participant Demographic Data

The participants ($N = 14$) were warrant officers, noncommissioned officers (NCOs), and DA civilians. Two participants held the rank of chief warrant (CW) 5, 4 held the rank of CW4, 3 held the rank of sergeant first class (SFC), one held the rank of staff sergeant (SSG), one held the rank of sergeant (SGT), and 3 were DA civilians. The participants represented a fairly broad range of experience with CAFRS and previous versions of flight records management systems.

Job Title (UTE 1):

- Flight records branch chief
- Battalion standardization pilot
- Standardization pilot
- Brigade standardization pilot
- UAS standardization instructor operator
- UH-60 repairer, nonrated crew member flight instructor

Job Title (UTE 2):

- Brigade standardization pilot
- Regiment standardization pilot
- ARNG standardization officer
- AH-64 Apache helicopter repairer/test and evaluation NCO
- UH-60 helicopter repairer
- 15W senior small group leader
- Helicopter instructor pilot
- Flight records branch chief

Test participant experience with the following systems:

ACFRS

(UTE 1)

Average = 0.3 years

Range = 0–2 years

(UTE 2)

Average = 2.9 years

Range = 0–5 years

CAFRS

(UTE 1)

Average = 2.5 years

Range = 0–5.3 years

(UTE 2)

Average = 3 years

Range = 0–3 years

ULLS-A

(UTE 1)

Average = 4.2 years

Range = 0–16 years

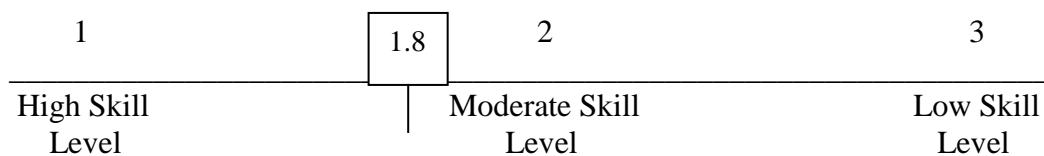
(UTE 2)

Average = 3.4 years

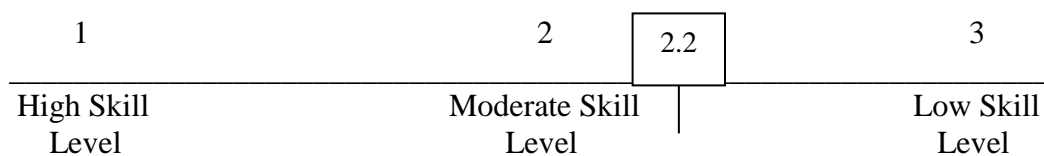
Range = 0–8 years

Computer skill level ratings (e.g., proficiency, experience, and comfort):

Mean rating for UTE 1 computer skill level was 1.8.



Mean rating for UTE 2 computer skill level was 2.25.



3.2 CAFRS Software User Interface Assessment

The CAFRS software user interface questionnaire was the primary data collection tool used in this assessment. Soldiers were asked specific questions about how logical and consistent a task was to complete, the number of steps involved in completing a task, and how quickly they were able to perform a task. Soldiers were also asked to rate the CAFRS software based on a number of variables including how easy it was to navigate, the speed at which the software performed tasks, and effectiveness of the Help menu. Table 1 is a summary of the test participant responses to the questionnaire.

Table 1 CAFRS software user interface assessment results

Changes to Find Person	Changes to Person Editor
Were task steps logical and consistent?	Were task steps logical and consistent?
Yes 100% No 0% N/A 0% (UTE 1)	Yes 100% No 0% N/A 0% (UTE 1)
Yes 100% No 0% N/A 0% (UTE 2)	Yes 87.5% No 12.5% N/A 0% (UTE 2)
Did task require an excessive number of steps?	Did task require an excessive number of steps?
Yes 0% No 100% N/A 0% (UTE 1)	Yes 100% No 0% N/A 0% (UTE 1)
Yes 0% No 100% N/A 0% (UTE 2)	Yes 0% No 87.5% N/A 12.5% (UTE 2)
Were you able to quickly perform this task?	Were you able to quickly perform this task?
Yes 100% No 0% N/A 0% (UTE 1)	Yes 100% No 0% N/A 0% (UTE 1)
Yes 100% No 0% N/A 0% (UTE 2)	Yes 75% No 12.5% N/A 12.5% (UTE 2)
Manage Readiness Level (RL) Progression	Manage Aircrew Training Program (ATP) Requirements
Were task steps logical and consistent?	Were task steps logical and consistent?
Yes 83.3% No 16.7% N/A 0% (UTE 1)	Yes 100% No 0% N/A 0% (UTE 1)
Yes 87.5% No 0% N/A 12.5% (UTE 2)	Yes 75% No 12.5% N/A 12.5% (UTE 2)
Did task require an excessive number of steps?	Did task require an excessive number of steps?
Yes 16.7% No 83.3% N/A 0% (UTE 1)	Yes 16.7% No 83.3% N/A 0% (UTE 1)
Yes 0% No 87.5% N/A 12.5% (UTE 2)	Yes 12.5% No 75% N/A 12.5% (UTE 2)
Were you able to quickly perform this task?	Were you able to quickly perform this task?
Yes 100% No 0% N/A 0% (UTE 1)	Yes 83.3% No 16.7% N/A 0% (UTE 1)
Yes 87.5% No 0% N/A 12.5% (UTE 2)	Yes 75% No 12.5% N/A 12.5% (UTE 2)

Table 1 CAFRS software user interface assessment results (continued)

<p>Manage Crewmember Training Record</p> <p>Were task steps logical and consistent?</p> <p>Yes 100% No 0% N/A 0% (UTE 1) Yes 87.5% No 0% N/A 12.5% (UTE 2)</p> <p>Did task require an excessive number of steps?</p> <p>Yes 33.3% No 66.7% N/A 0% (UTE 1) Yes 0% No 87.5% N/A 12.5% (UTE 2)</p> <p>Were you able to quickly perform this task?</p> <p>Yes 66.7% No 33.3% N/A 0% (UTE 1) Yes 75% No 12.5% N/A 12.5% (UTE 2)</p>	<p>Manage Waivers and Extensions</p> <p>Were task steps logical and consistent?</p> <p>Yes 100% No 0% N/A 0% (UTE 1) Yes 87.5% No 0% N/A 12.5% (UTE 2)</p> <p>Did task require an excessive number of steps?</p> <p>Yes 0% No 100% N/A 0% (UTE 1) Yes 0% No 87.5% N/A 12.5% (UTE 2)</p> <p>Were you able to quickly perform this task?</p> <p>Yes 100% No 0% N/A 0% (UTE 1) Yes 87.5% No 0% N/A 12.5% (UTE 2)</p>
<p>Manage Commanders's Task List</p> <p>Were task steps logical and consistent?</p> <p>Yes 100% No 0% N/A 0% (UTE 1) Yes 87.5% No 0% N/A 12.5% (UTE 2)</p> <p>Did task require an excessive number of steps?</p> <p>Yes 16.7% No 83.3% N/A 0% (UTE 1) Yes 12.5% No 75% N/A 12.5% (UTE 2)</p> <p>Were you able to quickly perform this task?</p> <p>Yes 83.3% No 16.7% N/A 0% (UTE 1) Yes 75% No 12.5% N/A 12.5% (UTE 2)</p>	<p>Changes to Record Status Report</p> <p>Were task steps logical and consistent?</p> <p>Yes 33.3% No 0% N/A 66.7% (UTE 1) Yes 87.5% No 0% N/A 12.5% (UTE 2)</p> <p>Did task require an excessive number of steps?</p> <p>Yes 0% No 50% N/A 50% (UTE 1) Yes 0% No 87.5% N/A 12.5% (UTE 2)</p> <p>Were you able to quickly perform this task?</p> <p>Yes 50% No 0% N/A 50% (UTE 1) Yes 87.5% No 0% N/A 12.5% (UTE 2)</p>

UTE 1 participant comments:

- Standard remarks for 7122s were not arranged in an order that was logical to me. Numerous steps in creating CTL templates; many tasks I was not familiar with due to not having experience managing individual aviation training folders (IATFs).
- Most windows required scrolling.
- CTL template: Name should be at top. I had to scroll to find it.
- Had some difficulty selecting aircraft for the CM to progress.

- For a new user of this program, the steps and navigation for the crew member training record were somewhat overwhelming.
- Manage readiness level (RL) Progression: Should operate through 7122 entry.

UTE 2 comments:

- 7120 -1: Task iteration is too complicated.
- Crew member task list date entry was a little tricky. Entering the date would not allow the day to be entered until you first adjusted the year. The date entry went from right to left instead of how one normally reads (left to right).

Table 2 CAFRS software user interface assessment results

2. Did you experience any problems with the following user-interface characteristics of CAFRS 4.0?		
Was the wording (terms, abbreviations, etc) presented on the screens simple and easy to understand?		
Yes	100%	No 0% (UTE 1)
Yes	100%	No 0% (UTE 2)
Were there any tabs or buttons that were not logically named?		
Yes	16.7%	No 83.3% (UTE 1)
Yes	0%	No 100% (UTE 2)
Was the information presented on the menu screens efficiently arranged so you did not have to spend a lot of time searching for it?		
Yes	66.7%	No 33.3% (UTE 1)
Yes	100%	No 0% (UTE 2)
Was the order in which you were required to enter data on the menu screens intuitive and logical?		
Yes	66.7%	No 16.7% N/A 16.7% (UTE 1)
Yes	100%	No 0% (UTE 2)
Could you easily reverse an input you made in CAFRS 4.0 (e.g., delete an entry) when you made an error?		
Yes	50%	No 50% (UTE 1)
Yes	87.5%	No 12.5% (UTE 2)
Did error messages provide enough information to understand the problem?		
Yes	100%	No 0% (UTE 1)
Yes	100%	No 0% (UTE 2)

UTE 1 participant comments:

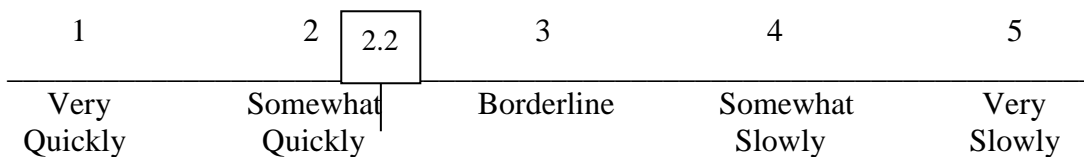
- CTL template: Only backspace could be used to delete number of iterations.
- Use to Person Editor in 3.0.3.
- Once you enter a comment on the 7120 and save it, you can't go back and modify or remove it.
- Trying to organize an out of date entry before the CM initials. Any changes or edits to the events will set it out of order and to the bottom of the page.
- Entering a 7122 event was not consistent with a paper 7122.

UTE 2 comments:

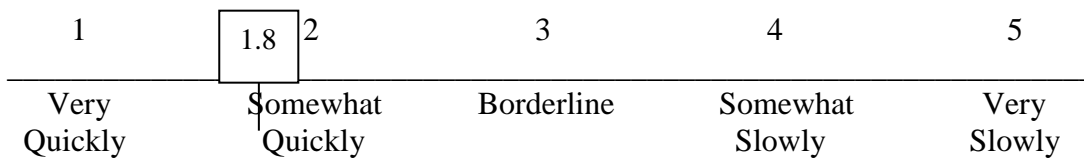
- Still needs permissions to work.
- Event entries regarding changes from one RL status to another status is confusing. I talked to Paul Williams about changing event entries to simplify. Ex: "Compl RL3 ref tng – Designated RL2 D/N, RL3 Night Vision Goggles (NVG)".
- Once entry is made on 7122 initial and signed and remark PART759 annotated and the entry was made by mistake, those remarks cannot be deleted on the 759.

3. Overall, how quickly were you able to navigate through the CAFRS 4.0 screens to perform tasks? (Circle one.)

Mean UTE 1 rating was 2.2.

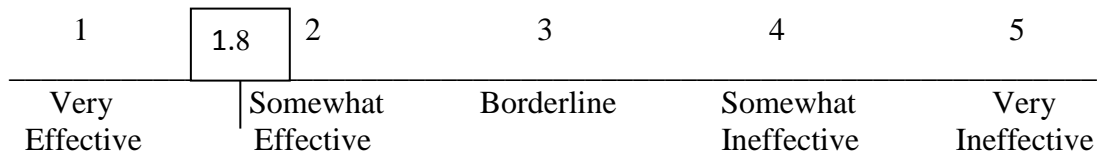


Mean UTE 2 rating was 1.8.

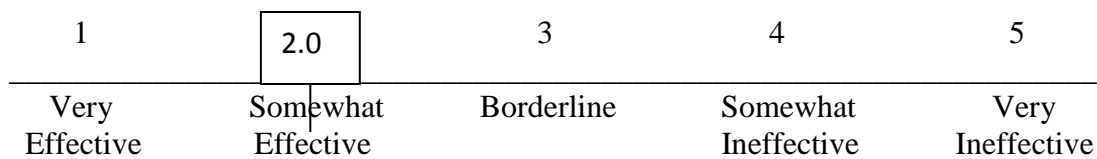


4. Rate the effectiveness of the CAFRS 4.0 “Help” for troubleshooting problems. (Circle one.)

Mean UTE 1 rating was 1.8.

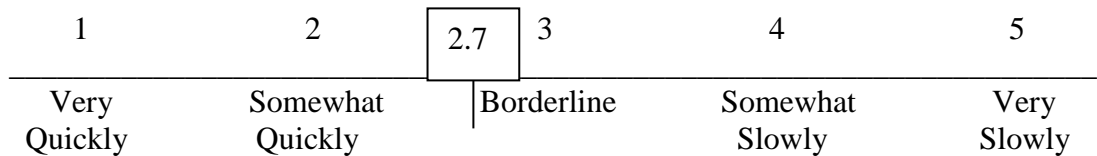


Mean UTE 2 rating was 2.0.

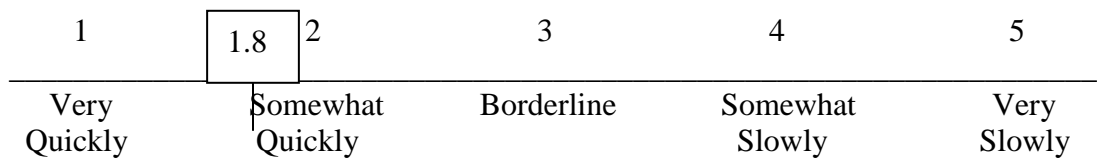


5. Rate how quickly (or slowly) CAFRS 4.0 operated on the computer. (Circle one)

Mean UTE 1 rating was 2.7.



Mean UTE 2 rating was 1.8.



If you rated the operating speed as “Somewhat Slowly” or “Very Slowly”, describe how this affected your performance:

UTE 1 participant comments:

- Waiting for pages to load.
- I think it was mostly due to an older computer.

UTE 2 participant comments:

- Speed was attributed to processing power of computer.

6. Overall, were you faster or slower when using CAFRS v4.0 versus using CAFRS v3.0.3?
(Circle one)

Mean UTE 1 rating was 3.4.

1	2	3	3.4	4	5
Much Faster With CAFRS 4.0	Somewhat Faster With CAFRS 4.0	About The Same	Somewhat Slower With CAFRS 4.0	Much Slower With CAFRS 4.0	

Mean rating was 2.7 (UTE 2).

1	2	2.7	3	4	5
Much Faster With CAFRS 4.0	Somewhat Faster With CAFRS 4.0	About The Same	Somewhat Slower With CAFRS 4.0	Much Slower With CAFRS 4.0	

If you were “Somewhat Slower” or “Much Slower” with CAFRS v4.0, explain why:

UTE 1 participant comments:

- Person Editor screen was totally rearranged and looks nothing like version 3.0.3.

UTE 2 participant comments:

- Person editor has been changed completely and also tool bars have been changed.
- First time using CAFRS, software was intuitive.

Describe any other positive or negative characteristics of CAFRS v4.0 that impacted your performance:

UTE 1 participant comments:

- Not having ability to change Part III on Person Editor could affect number of “errors” on closeout.
- Need UAS aircrew training manual tasks

UTE 2 participant comments:

- Would like to see more validation on 7122.

- CAFRS was very user friendly and will enhance our IATF capability in my unit.
- Fairly user friendly considering I have no experience with CAFRS.
- The system is very user friendly and easy to navigate. I am very limited in my experience. What I did notice was the lack of 2397-U form. Did not affect my performance, but it is a necessary form for incidents in the UAS community.
- Blocking Part III and aircraft qualification dates from being modified through Person Editor causes numerous errors on the 759.

During the UTEs, test participants completed a series of tasks and subtasks. For each task and subtask the evaluation software recorded the steps taken by the test participant and compared that with the appropriate preloaded steps. All steps taken in appropriate sequence to complete that specific task were recorded as a pass. Each occurrence of a diversion from the appropriate steps was recorded as a fail. The time required to complete the task was documented by the test participants. Table 3 shows each task, the number of passes and fails, and the average time (in minutes) it took to accomplish each task.

UTE 1 test participants had an 80% pass rate and took an average of 34 min to complete tasks (Table 3). UTE 2 test participants had a 94% pass rate and took an average of 32 min to complete tasks (Table 4). There was variability between test participants in how long it took them to complete the tasks. The variability was mostly because of the different levels of experience and proficiency with CAFRS among participants. The tasks that were performed during UTE 1 and UTE 2 were not identical. However, some of the increase in task pass rates and slight reduction in task times for UTE 2 can be attributed to software improvements that were made after UTE 1.

Table 3 UTE 1 task pass/fail and completion times

Task	Pass	Fail	Avg. Time (min)	Standard Deviation
Getting started: register common access card (CAC)	5	0	7	5
Getting started: set up and manage working sets	7	0	15	11
Getting started: find person	7	0	11	8
01 Create IATF for aviator	5	10	187	64
02 Create IATF for self	8	0	111	92
03 Create CTL template	7	2	28	18
01A Create DA7122 event	8	0	51	47
01B.1 Create DA 7120	3	4	33	15
01B.2 Create DA 7120	4	1	47	35
01B.3 Create DA 7120	1	1	9	5
01B.4 Create DA 7120	2	0	7	4
01C RL progression	2	0	9	6
01D Create and apply a unit wavier	3	0	5	0
01E Create and apply an individual waiver	3	0	4	1
01F Create and apply a unit extension	3	0	12	7
01G Create and apply an individual extension	3	0	8	4
TOTALS	71	18	34	...

Pass/failure percentage for tasks

80%

20%

Table 4 UTE 2 task pass/fail and completion times

Task	Pass	Fail	Avg. Time (min)	Standard Deviation
Getting started: register CAC	8	0
Getting started: set up and manage working sets	19	0
Getting started: find person	17	0
01A Create DA7122 event	25	0	94	41
01B.1_Create a DA 7120-R basic	25	5	50	43
01B.2_Create a DA 7120-R template	34	3	30	17
01B.3 Create DA 7120-1	18	1	19	13
01B.4 Create DA 7120-3	21	8	16	8
01C RL progression and timeline	27	0	40	24
02A Create and apply a unit waiver	21	0	18	9
02B Create and apply an individual waiver	7	1	22	10
02C Create and apply a unit extension	34	0	20	20
02D Create and apply an individual extension	26	3	29	23
03_Create a CTL Template	27	1	34	11
04_Search_IATF	16	0	7	4
05_Ad Hoc	8	0	8	3
TOTALS	333	22	32	...

Pass/failure percentage for tasks

94%

6%

If test participants encountered problems with the software, an issue trouble report was created. The list of UTE 1 issues is in the Appendix. Several of the issues were addressed and resolved between UTE 1 and UTE 2 to improve the user interface and software functionality.

4. Conclusions

4.1 CAFRS v4.0 Software Interface

The participants reported they were able to effectively use the CAFRS v4.0 software during UTE 1 and UTE 2. They indicated that they were able to quickly complete most tasks, navigate through the menu screens fairly quickly, task steps were logical and consistent, wording on the menu screens was easy to understand, error messages were understandable, and they were able to complete tasks about as quickly with v4.0 as with v3.0.3. They identified usability issues with some of the design characteristics of v4.0 (e.g., data entry for 7122 tasks). All participants reported that they experienced problems when using Person Editor during UTE 1. None of the participants reported problems using the Person Editor during UTE 2. Fifty percent of participants reported that it was easy to reverse an input when they made an error during UTE 1. Based (partly) on the changes made after UTE 1, 87.5% of participants reported that it was easy to reverse an input when they made an error during UTE 2.

4.2 Task Completion Rates and Tasks Times

Participants reported an 80% pass rate when performing tasks with the CAFRS v4.0 software during UTE 1. Data collected during UTE 1 resulted in improvements to the CAFRS v4.0 software based on user input during the assessment. Based (partly) on the improvements made after UTE 1, users reported a 94% pass rate when performing tasks during UTE 2. Overall task time completion was 34 min for UTE 1 and 32 min for UTE 2. There were some differences in the tasks performed during UTE 1 versus UTE 2.

In summary, the participants were able to effectively maintain aviation flight records and quickly complete most tasks during UTE 1 and UTE 2. Software interface and functionality issues were reported by the participants and addressed by the software developers during (and after) UTE 1 and are being addressed after UTE 2. Work should continue to address the issues until they are resolved. Future software releases should be assessed to ensure that an intuitive software interface is provided to allow users to perform flight records management tasks quickly and accurately. Consideration should be given to developing a mobile web-based version of CAFRS (that synchronizes with ULLS-A) to expedite data entry and reduce manpower requirements for records management.

5. References

O'Brien TG, Charlton SG. The role of human factors testing and evaluation in system development. In: Handbook of human factors testing and evaluation. Mahwah (NJ): Lawrence Erlbaum and Associates; 1996.

Appendix. CAFRS v4.0 UTE 1 Trouble Reports

This appendix appears in its original form, without editorial change.

Number	Rec. Priority	Summary	Status
9720	2	v4.0 UTE 1: (TR 54) - RL Progression -- Select N/A for NVG get error, but if you leave it blank no error.	Closed (Cannot Reproduce)
9711	-1	v4.0 UTE 1: (TR 16) - 7122 Clear Out of Sequence entries	Closed (Duplicate)
9729	4	v4.0 UTE 1: (TR34): CTL Template: Enter Eval iterations not intuitive.	Closed (Duplicate)
9730	4	v4.0 UTE 1: (TR 18) - W&E: Redundant (Hours) in comment instead of entering actual hours not useful.	Closed (Duplicate)
9753	5	v4.0 UTE 1: (TR 13) - DA 7120-R: After entering a 12 month annual and first and second period date ranges and hours, prorate of first and second period hours are prorated with no logic	Closed (Duplicate)
9768	5	v4.0 UTE 1: (TR 31) -- DA 7120-R: Date Time picker for Part 3 does not completely calculate and display from crew member's ATP periods	Closed (Duplicate)
9772	-1	v4.0 UTE 1: (TR 25) -- DA 7120-R: DA 7120 Creation Part IV Commander, can there be a dropdown or right click for personnel in commander roles?	Closed (Duplicate)
9778	-1	v4.0 UTE 1: (TR 86) -- DA 7120-R: Annual and Semi-Annual Periods should auto fill from birth month entry in part 1.	Closed (Duplicate)
9783	-1	v4.0 UTE 1: (TR 65) -- DA 7120-R: Multiple Additional Aircraft, last entered is what fills in 759 Part III Block 15.	Closed (Duplicate)
9784	-1	v4.0 UTE 1: (TR 83) -- DA 7120-1: Editing task iterations after CM and CDR sign should require re-signing (CDR initial).	Closed (Duplicate)
9785	-1	v4.0 UTE 1: (TR 24) -- DA 7122+7120: Cannot complete new 7120 for addition aircraft until CM initials the 7122 event.	Closed (Duplicate)
9700	3	v4.0 UTE 1: (TR01)- Nav Tree unable to redock when PC is using AERO Windows Theme.	Closed (Fixed)
9701	2	v4.0 UTE 1: (TR07) - W&E: Requesting NVG extension in noted step causes attached error. Event guid doesn't exist.	Closed (Fixed)
9703	2	v4.0 UTE 1: (TR08) - Person Editor: Change CAFRS user to Aviation Personnel does not create a viable record.	Closed (Fixed)
9707	4	v4.0 UTE 1:(TR 32) - CTL Template: 3000 Series Task creation, save of task is not intuitive and no confirmation	Closed (Fixed)
9709	5	v4.0 UTE 1: (TR 101) - 7122 Add an event type for Non Medical Suspension	Closed (Fixed)
9710	4	v4.0 UTE 1: (TR11) - 7122 Customize button prompts to save	Closed (Fixed)
9714	4	v4.0 UTE 1: (TR 34) - CTL Template -- Entering Iterations with E for Eval is not intuitive.	Closed (Fixed)
9717	2	v4.0 UTE 1: (TR44) - 7122 show complete list of ACFT series for Commander's Eval - Record Review entry	Closed (Fixed)
9718	5	v4.0 UTE 1: (TR36) - CTL Template Export -- move export button to top of window.	Closed (Fixed)

9719	5	v4.0 UTE 1: (TR 53) - W&E; When entering an individual extension, need to be able to enter specific details in remark.	Closed (Fixed)
9721	2	v4.0 UTE 1: (TR47) - 7122 CDR Signature required but not allowed	Closed (Fixed)
9722	2	v4.0 UTE 1: (TR 99) -- DA 7120: After adding remarks to saved 7120, 'Exception During Save' error is thrown upon re-saving.	Closed (Fixed)
9724	4	v4.0 UTE 1: (TR 37) -- DA 7120-3: Remarks on -3 are all run together and unreadable on the 7120 DA FORM, need to be separate lines.	Closed (Fixed)
9725	4	v4.0 UTE 1: (TR73) - CTL Template -- Could not delete or change iterations and numbers under 1000 series task on the CTL Template.	Closed (Fixed)
9726	3	v4.0 UTE 1: (TR96) - W&E - Unit Waiver at battalion level doesn't include sub units.	Closed (Fixed)
9732	5	v4.0 UTE 1 (TR58) - Permissions: CAFRS needs the ability to apply delegation authority for the ATP commander. For signing the DA Form 7120 and the DA Form 7122	Closed (Fixed)
9736	4	v4.0 UTE 1: (TR 76) - DA 7120-R: Remarks disappear after saved/closed and reopened on the DA FORM 7120-R. This happens in Part II Authorized flight Duties.	Closed (Fixed)
9737	5	v4.0 UTE 1: (TR Multiple) - 7122 Add event for categories	Closed (Fixed)
9741	5	v4.0 UTE 1: (TR22) - 7122 Add simulators to Aircraft dropdown	Closed (Fixed)
9745	5	v4.0 UTE 1: (TR30) - 7122 Crew member can initial without realizing there is a related remark on page 2	Closed (Fixed)
9749	5	v4.0 UTE 1: (TR 05) - DA 7120: Evals listed in the task dropdown on the 7120 are not bold/caps like in the template. Need them to be at least CAPS	Closed (Fixed)
9750	4	v4.0 UTE 1: (TR29) - 7122 Changing Event type that contains a default remark prompts to change the default remark	Closed (Fixed)
9751	4	v4.0 UTE 1: (TR69) - 7122 Changing the Event type clears the Aircraft dropdown	Closed (Fixed)
9756	5	v4.0 UTE 1: (TR82) - 7122 Custom Event change 'Evaluation Requirement' to a dropdown selection	Closed (Fixed)
9757	5	v4.0 UTE 1: (TR 19) - DA 7120: Want to type in Remarks fields instead of right click edit.	Closed (Fixed)
9758	5	v4.0 UTE 1: (TR68) - 7122 Need capability to manually enter historic data	Closed (Fixed)
9761	5	v4.0 UTE 1: (TR 26) -- DA 7120: While creating, save 7120, form blanks. We want to review data, should not clear form.	Closed (Fixed)
9763	4	v4.0 UTE 1: (TR63) - 7122 Extension restricts duties	Closed (Fixed)
9765	5	v4.0 UTE 1: (TR 72) - 7122 Red Date on Printed DA Form	Closed (Fixed)
9767	4	v4.0 UTE 1: (TR80) - 7122 Need list of uninitialed events	Closed (Fixed)
9771	4	v4.0 UTE 1: (TR 79) -- DA 7120: Right Click on a remark should select the current row.	Closed (Fixed)

9775	5	v4.0 UTE 1: (TR 51) - DA 7120-R: Completion Dates for Part 4 of 7120-R should be blank.	Closed (Fixed)
9780	5	v4.0 UTE 1: (TR 92) -- DA 7120-R: The drop down lists for PART IV Other Evals and PART III Other Flying Hour requirements should pull from DB not from template.	Closed (Fixed)
9781	4	v4.0 UTE 1: (TR 81) -- DA 7120-R: There is no indication similar aircraft type information exists until you right click on the aircraft field.	Closed (Fixed)
9793	4	v4.0 UTE 1: 7122: GUI opens offset to Start Window and should not.	Closed (Fixed)
9798	5	v4.0 UTE 1: W&E: Add all extensions and waivers to the 759 part 4	Closed (Fixed)
9706	4	v4.0 UTE 1: (TR17) - CTL Template 3000 Series Task label correction.	Closed (OBE)
9712	3	v4.0 UTE 1: (TR 33) - CTL Template: need confirmation of save of template	Closed (OBE)
9752	5	v4.0 UTE 1: (TR97) - 7122 Add event text for RL Progression - "must progress to next RL by <90 day date from now>"	Closed (OBE)
9704	-1	v4.0 UTE 1: (TR14) - UIC Description standardization	Closed (WAD)
9713	5	v4.0 UTE 1: (TR 39) - Creating a DA 4186 will trigger a 7122 Event entry	Closed (WAD)
9716	-1	v4.0 UTE 1: (TR 35) - New GUI's (7120, CTL Template, and 7122) do not open all on visible window.	Closed (WAD)
9733	-1	v4.0 UTE 1 (TR 74) - MWS: Remove a person from working set is not intuitive at all.	Closed (WAD)
9738	5	v4.0 UTE 1: (TR03) - 7122 DA Form Page 2 need to add crew member information	Closed (WAD)
9744	-1	v4.0 UTE 1: (TR102) - CAC registration not allowed for Foreign Military (FMs) in TRADOC	Closed (WAD)
9754	5	v4.0 UTE 1: (TR 94) - 7122 Remove duplicate Evals from the standard eval list	Closed (WAD)
9762	-1	v4.0 UTE 1: (TR 62) - Add CM initial menu option like the CDR sign	Closed (WAD)
9764	-1	v4.0 UTE 1: (TR 67) - 7122 change tab order when entering an event	Closed (WAD)
9777	-1	v4.0 UTE 1: (TR 59) - DA 7120: Do not need for long remarks to be pushed from the 7120-R and 7120-1 to the 7120-3.	Closed (WAD)
9782	5	v4.0 UTE 1: (TR 84) -- DA 7120-R: Don't allow selection of impossible combinations (eg: PI/PC/MP) on the station selections.	Closed (WAD)
9734	5	v4.0 UTE 1 (TR 100) DecertifiedCloseout_WhatCanBeChangedPosted	Open, assigned to Doss, Katherine
9699	-1	v4.0 UTE 1: (TR 02) - 7122 Crew member initial events before they take affect	Open, assigned to Reece, Don

9702	5	v4.0 UTE 1: (TR 09) - 7122 Delayed Commander Signature	Open, assigned to Reece, Don
9715	5	v4.0 UTE 1: (TR43) - 7122 Remark for event type 'Assignment' should auto-populate data within the remark text from Person Editor	Open, assigned to Reece, Don
9728	-1	v4.0 UTE 1: (TR 55) - DA 7120-1: CAFRS needs to disable tasks and/or text fields that do not apply to prevent data from being entered in the wrong text field.	Open, assigned to Reece, Don
9739	4	v4.0 UTE 1: (TR06) - 7122 when adding/editing multiple events, clicking saving should cause a simultaneous update to events listed on the Events tabs	Open, assigned to Reece, Don
9740	4	v4.0 UTE 1: (TR22) - 7122 when adding events should automatically select the crew member's primary aircraft	Open, assigned to Reece, Don
9742	5	v4.0 UTE 1: (TR23) - 7122 Retain Duty Position when creating multiple events	Open, assigned to Reece, Don
9743	4	v4.0 UTE 1: (TR28) - 7122 Add a Duty Position dropdown to select from for person recording the event.	Open, assigned to Reece, Don
9746	5	v4.0 UTE 1: (TR42) - 7122 Need a method for correcting qualification date information using 7122 entries	Open, assigned to Reece, Don
9747	5	v4.0 UTE 1: (TR 04) - DA 7120-R: FAC Level can be changed through personnel editor aviation personnel data tab even after the CDR has signed DA Form 7120	Open, assigned to Reece, Don
9748	-1	v4.0 UTE 1: (TR49) - 7120 need ability to assign Additional aircraft when individual has more then one additional aircraft	Open, assigned to Reece, Don
9755	5	v4.0 UTE 1: (TR89) - 7122 Add the Customize Event button to Add events window	Open, assigned to Reece, Don
9760	5	v4.0 UTE 1: (TR 21) -- DA 7120: Provide the capability for the user to maximize all windows (e.g., 7120) to allow data entry/view data/ edit data without having to scroll through the window to view/edit/add data.	Open, assigned to Reece, Don
9766	4	v4.0 UTE 1: (TR 70) -- DA 7120: Delete Key will not change number of iterations. Only Backspace key works. Should be able to use both keys.	Open, assigned to Reece, Don
9773	4	v4.0 UTE 1: (TR 38) -- DA 7120-R: Duties listed in the 7120-R PART 2 must have a remark and do not	Open, assigned to Reece, Don
9774	-1	v4.0 UTE 1: (TR 41) - DA 7120: Changed several fields on a 7120 that is already signed by the commander (ie. FAC level, Additional and Primary aircraft).	Open, assigned to Reece, Don
9776	5	v4.0 UTE 1: (TR 50) - DA 7120-R: On Part IV and V Eval periods should default to last period entered, allow us to copy date down for all evals.	Open, assigned to Reece, Don
9779	4	v4.0 UTE 1: (TR 66) -- DA 7120-1: IPs know task names but not numbers, can type ahead work on both numbers and task name parts?	Open, assigned to Reece, Don
9799	-1	v4.0 UTE 1: TRADOC Only: Allow corrections to quals prior to graduation.	Open, assigned to Reece, Don

9829	5	v4.0 UTE 1 CTL Template: Add 7120-3 to template creation.	Open, assigned to Reece, Don
9830	5	v4.0 UTE 1: DA 7120-3 apply template should include new -3 template remarks	Open, assigned to Reece, Don
9759	5	v4.0 UTE 1: (TR 20) -- DA 7120-R: Default Annual Period to Birth month.	Open, assigned to Roberts, Phillip
9770	4	v4.0 UTE 1: (TR 48) -- DA 7120: Remarks are not in numerical order.	Open, assigned to Roberts, Phillip
9735	5	v4.0 UTE 1 (TR 103) - Graduation, identify what event should be posted at grad to IERW 7122	Open, assigned to Williams, Paul F
9727	3	v4.0 UTE 1: (TR 12) -- DA 7120-R: Prorate against a 12 month year is removing one month's hours and should not.	Released to Testing, assigned to Roberts, Brad S
9731	5	v4.0 UTE 1: (TR 57) - ATP Reports -- closeouts ready to sign	Released to Testing, assigned to Smith, Tracy
9708	5	v4.0 UTE 1: (Multiple) - 7122 Corrections required for event data	Released to Testing, assigned to Wells-Whitted, Davina

List of Symbols, Abbreviations, and Acronyms

ACFRS	Aviation Center Flight Records System
AFRS	Automated Flight Records System
ARNG	Army National Guard
ARL	US Army Research Laboratory
ATS	air traffic services
ATM	air traffic management
ATS	air traffic services
CAC	common access card
CAFRS	Centralized Aviation Flight Records System
CCDB	CAFRS Central Database
CDCP	CAFRS Data Collection Point
CTL	commander's task list
CW	chief warrant
DA	Department of the Army
FORSCOM	US Army Forces Command
HRED	Human Research and Engineering Directorate
IATF	individual aviation training folder
NCO	noncommissioned officer
RL	readiness level
SFC	sergeant first class
SGT	sergeant
SSG	staff sergeant
TRADOC	US Army Training and Doctrine Command
UAS	unmanned aircraft system

ULLS-A	Unit Level Logistics System-Aviation
UTE	User Test Event

1 DEFENSE TECHNICAL
(PDF) INFORMATION CTR
DTIC OCA

2 DIRECTOR
(PDF) US ARMY RESEARCH LAB
RDRL CIO LL
IMAL HRA MAIL & RECORDS
MGMT

1 GOVT PRINTG OFC
(PDF) A MALHOTRA

1 ARMY RSCH LABORATORY – HRED
(PDF) RDRL HRM D
T DAVIS
BLDG 5400 RM C242
REDSTONE ARSENAL AL 35898-7290

1 ARMY RSCH LABORATORY – HRED
(PDF) RDRL HRS EA DR V J RICE
BLDG 4011 RM 217
1750 GREELEY RD
FORT SAM HOUSTON TX 78234-5002

1 ARMY RSCH LABORATORY – HRED
(PDF) RDRL HRM DG J RUBINSTEIN
BLDG 333
PICATINNY ARSENAL NJ 07806-5000

1 ARMY RSCH LABORATORY – HRED
(PDF) ARMC FIELD ELEMENT
RDRL HRM CH C BURNS
THIRD AVE BLDG 1467B RM 336
FORT KNOX KY 40121

1 ARMY RSCH LABORATORY – HRED
(PDF) AWC FIELD ELEMENT
RDRL HRM DJ D DURBIN
BLDG 4506 (DCD) RM 107
FORT RUCKER AL 36362-5000

1 ARMY RSCH LABORATORY – HRED
(PDF) RDRL HRM CK J REINHART
10125 KINGMAN RD BLDG 317
FORT BELVOIR VA 22060-5828

1 ARMY RSCH LABORATORY – HRED
(PDF) RDRL HRM AY M BARNES
2520 HEALY AVE
STE 1172 BLDG 51005
FORT HUACHUCA AZ 85613-7069

1 ARMY RSCH LABORATORY – HRED
(PDF) RDRL HRM AP D UNGVARSKY
POPE HALL BLDG 470
BCBL 806 HARRISON DR
FORT LEAVENWORTH KS 66027-2302

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